U.S. Environmental Protection Agency
Office of Science Policy
National Forum on Tribal Environmental Science
Quinault Beach Resort and Casino
78 State Route 115
Ocean Shores, WA 98569

September 24 – 29, 2006
MEETING SUMMARY

September 25, 2006

Formal Welcoming Session

David Nelson, Tribal Science Council (TSC) Tribal Co-Chair, Cheyenne River Sioux Tribe, Eagle Butte, SD; Roland Hemmett, TSC Agency Co-Chair, U.S. Environmental Protection Agency (EPA), Region 2, Edison, NJ

Roland Hemmett and David Nelson welcomed participants to the meeting and introduced the Quinault Honor Guard, who presented the colors. Following the presentation of the colors, Dennis Martin of the Quinault Indian Nation (QIN) gave the opening prayer.

Fawn Sharp, president of the QIN, welcomed participants to the QIN and urged them to participate in the field trips so that they could experience the beauty of the land firsthand. The Quinault Reservation comprises 220,000 acres and 36 miles of pristine coastline. The beaches are closed to the public and protected. The QIN appreciates scientists and the data they collect; sharing and collaboration is important for collecting useful environmental data. For example, in 2005 the State of Washington was trying aggressively to develop water quality standards; local tribes encouraged the state to include fish presence data. The state did not include the data, and the tribes contacted EPA for assistance. The Washington water quality standards were not approved, and the state was told to include fish presence data. The new standards will be in effect on October 31, 2006. Conferences such as this are instrumental for networking, collaborating, and sharing ideas and information.

Guy Capoeman, Vice President of the QIN, welcomed participants and introduced Larry Workman, Manager of Centralized Communication for the QIN. Mr. Workman gave a brief overview of Quinault Country. The reservation is on the southwest corner of the Olympic Peninsula, encompassing 330 square miles of land, including coastal areas, two valleys, second growth forest, swampy wetlands (approximately 2% of total land, which is in lake bed remnants of former glaciers), Lake Quinault, two large river systems, and several smaller river systems. The weather is influenced by the Olympic Mountains. Glaciers from 20,000 years ago created most of the land forms found on the reservation.

The Quinault people originated as land mammal hunters, but as the climate continued to change and the glaciers began to retreat, the Quinault became sea mammal hunters and fisherman. The Quinault were known as the Salmon People and were the southernmost whale hunting tribe along the West Coast. Because the cedar was considered the tree of life to the Quinault, they also were known as the Keepers of the Cedar. Cedar was important in everyday life, used in clothing, housing, and canoe making.

The Quinault land was divided into 88 allotments, and the fragmented ownership of the land is a challenge in managing the land and natural resources. Liquidation of most of the old growth forest in the 20th century also contributes to the challenge of natural resource management.

The Quinault of today still primarily are fisherman. They also have an intense forestry program and an active tree-planting program. There is a variety of wildlife on the reservation, including threatened and endangered species. A new challenge is invasive species (e.g., the European green crab). Plant species also are abundant on the reservation, and mushrooms, previously not utilized, have become an important resource to the Quinault. There are several cultural stands of trees dedicated for totem poles and canoes. Young Quinault people travel on canoe trips to understand their ancestors and prepare for adulthood. Mr. Workman ended his speech with a Quinault line: "From the time of the first moon to the time of the last sun."

Mr. Hemmett introduced the members of the TSC and explained that the TSC is made up of a group of tribal and EPA representatives established at the request of the National Tribal Caucus. Developed through the Office of Research and Development (ORD), the TSC is a tribally directed, joint EPA effort to address environmental science issues that are priorities for Tribes throughout the country. The TSC published a paper in May of 2006 regarding tribal science issues. The tribes did the majority of the planning for this meeting, with EPA acting in a consulting capacity. The agenda was developed based on four themes: Air, Water, Earth, and Community Health. Approximately 90 percent of meeting attendees are tribal, and EPA would like attendees' input to develop a tribal training program.

Mr. Nelson described the need to integrate tribal tradition, teaching, and culture with scientific data and statistics. Originally, tribes did not want EPA input on how to keep tribal land and water clean, and EPA did not understand the tribal traditions and cultures, but the two groups are learning that it is necessary to integrate each other's knowledge and that traditions and science must come together. He introduced the EPA members of the TSC and thanked them for their help in planning this meeting.

Keynote Address

Tony David, St. Regis Mohawk Tribe, introduced Oren Lyons, Faithkeeper of the Turtle Clan of the Onondaga Nations. Chief Lyons helped establish the United Nations (UN) Working Group on Indigenous Populations and is a member of the UN Human Rights Division. A full professor at the State University of New York at Buffalo, he recently was named the State University of New York Distinguished Service Professor. In addition to receiving the Ellis Island Congressional Medal of Honor, he helped to diplomatically resolve the 1990 Oka Crisis, a violent land dispute in Quebec, Canada, involving the Mohawk Nation.

Oren Lyons, Onondaga Nation Council of Chiefs of the Six Nations of the Iroquois Confederacy and State University of New York, University at Buffalo, Department of American Studies, Buffalo, NY

Chief Lyons gave a traditional greeting and thanked the TSC for the invitation to speak. He attended the TSC Risk Assessment/Health and Well-being Workshop in Albuquerque, New Mexico, in 2003. Although the report says that progress is being made, there will be no progress until cooperation is favored over competition, relationships are valued over profits, and family and community are favored over accruing wealth. Meetings have been taking place and now that constituencies, issues, and positions have been clarified, it is time to taken action and make what has been discussed at these meetings operational. Additionally, information comes from unexpected moments, from anybody and anywhere; people must learn to be aware of this. The original, democratic peoples took instruction from the earth and the natural world and fit themselves into that world; they did not try to control the world.

The Iroquois have many names, including the native Haudenosaunee (People of the Long House), and still have a traditional council of chiefs. Roughly 16 million Indians were living in North America at the time of Columbus' landfall, but that number dropped to 250,000 by the beginning of the 20th Century. Today, roughly 2.5 million people in the United States identify themselves as Indian. It took 450 million years to reach a world population of 2.5 billion; it took 55 years to reach the second 2.5 billion. Doubling

a population of this size over 55 years is not sustainable. During the worldwide hunt for sustainable resources, Indians must keep their land and not trade it. Humans must learn to share and work together to determine sustainable resources, regardless of color or nationality.

The Great Peacemaker came among the Indians more than 1,000 years ago and brought peace to six warring Indian Nations: Onondaga, Mohawk, Seneca, Cayuga, Oneida, and Tuscaroras. They gathered at the shore of Onondaga Lake (currently the only Superfund lake in the United States, with 400 tons of mercury), and the Peacemaker gave the tribes principles to live by and defined democratic structure. Because the earth is female, women are in charge of earth and water; men are in charge of fire. Although women are in charge, there must be a consensus, because locked leadership cannot help the people.

The first principal to live by is peace. It is not possible to have peace without health, but 50 million people in the United States do not have health care. The second principle is of equity and justice; one cannot have justice without equity. The third principle is the power of the good minds, which encompasses reason. The Great Peacemaker then planted a great white pine, with four roots of truth growing in the four directions of the earth. If one is lost, the roots can be followed back to their source to find the Great Peace. The Great Peacemaker's laws must not be challenged, but nations today are challenging these laws and one of the results is global warming. Although people are insignificant in terms of the earth, they have been able to cause systemic change.

The Great Peacemaker instructed the leaders to make all decisions with the seventh generation in mind, so that this generation too will have a sustainable life. The responsibility of all life is in the leaders' hands. Leaders must understand the problems before they can find a solution. The problem must be examined and explored. Corporations have usurped traditional leadership, and business has usurped government. Profit is the driving force of today, and corporations, which are independent entities, have allegiance only to themselves. The corporate leaders must accept the leadership of all life and must learn to understand the earth. Mother Nature has only unchallengeable laws, and corporate leaders must adhere to these laws.

It is time for action, and each individual must be a leader and think for himself. Although it is common for humans to be afraid, we must move beyond the fear. Strength comes from being united, so we must also be united in our efforts. This is illustrated by Einstein's observation that the strongest law of the universe was that of "compound," which starts slow, gains speed, and then explodes. Humans are in the acceleration phase right now, and the two "perfect storms" of global warming and increasing human population will soon explode. Any profit taken is at the expense of future generations, and leaders must stop this acceleration. Chief executive officers point the fingers at stockholders for demanding profits, so the stockholders must then be responsible and think of the future. Although earth's resources are finite, humans are not acting as if they are finite. To cool itself from global warming, the earth's atmosphere will begin to snow continuously for more than 100 years. The snow will compress into ice, which will form glaciers. Another ice age will occur.

Fortunately, cooperation is coming about. EPA and tribes are working together and planning, trying to stop catastrophic environmental events. By the end of this meeting, there must be a plan of action in place; information that has been gathered must be acted on. There is no compromise with the laws of nature, so the plan must get humans back in line with these laws. The plan must be equitable, fair, and consider the entire earth, not just the United States. It is the job of scientists and leaders to determine how to address global changes. Courage of conviction is necessary, and racism must not get in the way. Action must be taken now, because changes are going to occur at a surprising rate.

Alaska Global Climate Change

Lydia Olympic, Igiugig Tribal Village Council, Igiugig, AK

Lydia Olympic illustrated Chief Lyon's point about being ready to accept information from unusual places by relating an anecdote that happened in her village, which has a population of 47 people. One February, a little girl in the village found it very amusing that the squirrels were awake when they should be sleeping. The girl's excitement led Ms. Olympic to pay more attention to the changes that were occurring in her village and asked the elders if they had any stories about global warming. They did not; nor is there an Igiugig word for global warming.

Changes that are occurring include squirrels coming out of hibernation in February, bears coming out of hibernation in March, and birds arriving in April. There is no food to sustain these creatures in these months. The brown bear is moving into northern territories where they have never been, and the spruce bark beetle is infesting more trees because of the higher temperatures. The waters now are so warm that there are tuna, sharks, and tropical fish present for the first time. The thinner ice means earlier breakup, which in turn affects seal-hunting and causes human deaths. Cannibalism among polar bears is being recorded for the first time. Coastline erosion and the rise in sea level are resulting in floods and villages having to move locations. There is an increased number of mosquitoes and sand flies. Additionally, large numbers of salmon have died in lakes before spawning.

Alaska native people still live off of the land and know that the environment is not healthy, and it is a matter of life and death. The stories of Alaska native people need to be told, and they need to be heard. If the world is ready to listen to indigenous people who know and understand the rhythm of the earth and act on this knowledge, then the earth's balance can return.

American Indian Alaska Native Climate Warming Working Group: A Red Paper

Daniel R. Wildcat, Haskell Indian Nations University, Haskell Environmental Research Center, Lawrence, KS; Margaret Hiza-Redsteer, U.S. Geological Survey, Earth Surface Processes, Flagstaff, AZ; Roberto Gonzalez-Plaza, Lummi Nation, Northwest Indian College, Department of Science, Bellingham, WA

Daniel Wildcat explained that this paper began as the result of the Impact of Climate Change on Indigenous Peoples Symposium held at the Haskell Indian Nations University in June of 2006. The symposium was part of a National Science Foundation (NSF)-funded effort, the Center for the Remote Sensing of Ice Sheets. Additional volunteers to commit to this project are being sought. Although global warming especially is apparent in Alaska, changes can be seen everywhere. It is necessary to collect accurate data so that tribal leaders can make informed decisions regarding the future. Dr. Wildcat introduced two collaborators of the project, who gave their personal perspectives.

Margaret Hiza-Redsteer, a resident of the Navajo Nation as well as a member of the U.S. Geological Survey, stated that there is a difference between a Native American scientist and a scientist who happens to be Native American. Scientists are needed to investigate the changes in rainfall, rain-to-snow ratio, and so forth. Many Native American scientists have learned science from dominant-society institutions and have lost touch with their native and traditional ways, so funding is being secured to bring these scientists back to reservations.

The National Weather Service (NWS) data are inaccurate for the Navajo Nation. The NWS stations are outside of the nation and predict data inside the nation's borders via computer modeling. The computer predictions show more rainfall than actually occurs. The nation is attempting to set up a weather station within its borders and bring Native American geoscientists to the nation to interpret the data. Native

American traditional observations are science; therefore, science is not a new concept to Native American nations.

Roberto Gonzalez-Plaza stated that global warming is human driven, and the changes as a result of this phenomenon are happening fast; humankind has become a geophysical force. A personal change in behavior is required to stop what is happening on earth; nothing will change without a change to human actions. The climate workgroup, formed to take action on "global burning," welcomes anyone who would like to become a member.

It is necessary to be aware always of changes, even when they are imperceptible. The changes in Alaska and the southwestern United States are obvious. The changes in the Pacific Northwest are not as obvious, but they are present. The changes must be analyzed from a systemic approach (i.e., every change means something and affects the system as a whole). Inequity is rampant throughout the world, and the scientific advances made in the name of health and well-being are an illusion. We must respond to Chief Lyon's call to action immediately.

Dr. Wildcat explained that geoscience must be made relevant to the big picture and that American Indian and Alaska Native geoscientists with indigenous ideas are needed. Nature to Indians is not an abstraction, and Indian scientists can bring this aspect to Western science and technology. It must be noted that each culture and tribe emerges out of a specific landscape and, therefore, are different from each other. Each culture has learned how to exist within each of these landscapes. Humankind needs this indigenous realism, and stereotypical assessments of traditional environmental knowledge cannot be accepted. Traditional environmental knowledge is not romantic or unrealistic and does not mean going back to the past. Teaching traditional environmental knowledge, as opposed to science out of books, is more relevant and more desirable to learn.

Solving the problem of climate heating impacts will require indigenous ingenuity. This "indigenuity" will in turn need the empowerment of native natural intelligence, imagination, inventiveness, agile leadership, and honesty. Indigenuity plays to the strengths of the Indian people and is emergent from the nature-culture nexus. It is experience-centered, experiment-rich, and informed by attentiveness to the unique biomes and environments of the earth.

Volunteers, especially tribal college partners, are needed to work around existing agency, tribal government, and university boundaries. This project includes a long-term NSF proposal to assemble a partnership-coordinated geoscience and diversity program between tribal colleges where undergraduate scientists will perform geoscience research and gain experience while collecting data on tribal ground that tribes need, especially as the Bureau of Land Management is $60 million behind in surveying tribal properties. American Indian geoscience literacy is necessary to ensure that indigenous tribal knowledge of landscapes and climates are valued, used, and incorporated into tribal geoscience education and research.

Wealth is found in relations. A collaborative effort between federal agencies, tribes, and tribal colleges must be formed to ensure that geoscience education and research opportunities for American Indians and Alaska Natives are integrated and coordinated. When looking at the natural world, Western scientists and planners see resources; American Indians see relations. If society began to view the natural world in this indigenous way, many changes for the better would occur.

Lifeway protection activities can be advanced by using the latest information technologies (e.g., podcasting, Web technology, etc.) to create a Web-based clearinghouse for accurate information and knowledge about the impact of global warming on indigenous lifeways. Such a clearinghouse will benefit many communities, tribes, and individuals.

Opening Session Discussion

Preston Hardison, Tulalip Tribes, described a clearinghouse project on climate change already underway at http://climate.nativecommons.net. A database system is being developed, and the project leaders are looking for collaboration regarding data exchange models. Currently, there are more than 1 million records about both science and traditional environmental knowledge, including links to scientific and tribal literature that discuss environmental change and impacts. Such an effort requires collaboration; information must be shared to survive because this is a crisis situation.

A participant expressed frustration with the lack of communication between tribes. EPA is to be commended because it has good communication with tribes. A system for communication must be established.

Christine Chaisson, The LifeLine Group, described the George Washington University Graduate School for Political Management's Semester in Washington Program, which allows students to study in Washington and learn how the federal government works, including elections, diplomacy, lobbying, and issues management. There are 11 guaranteed spots for Native American students.

September 28, 2006, Plenary Session
Facilitator: Claudia Walters, EPA, ORD, Sustainability Programs, Washington, DC

Cultural Sustainability Models: Using Our "Ways of Knowing" in Management and Group Discussion

Claudia Walters, EPA, ORD, Sustainability Programs, Washington, DC

It is important to review history to see from where we have come, learn from experience, and celebrate what has been done right. EPA's history during the past 35 years has shown that many environmental improvements have been accomplished, and policies and programs have been developed to address environmental issues. Other environmental successes have occurred outside EPA as well. Examples of environmental disasters that have been managed successfully include the Cuyahoga River, the Valley of the Drums, and bald eagle populations.

New and challenging issues, from local to global, that impact all levels of the environment always are on the horizon. It is necessary to understand the scope of these issues. Global change, including global warming, is the most pressing issue. Scientists have found much evidence of abrupt climate change, including measurements of greenhouse gas in Antarctic ice cores. Carbon dioxide found in ice cores has increased by more than 35 percent in the last 150 years, after remaining stable for thousands of years. Although increased carbon dioxide is not created at the Poles, the Poles are affected greatly by this increase, including widespread melting of ice and breakup of ice sheets. Polar bears are a species at particular risk; polar bear populations have declined significantly during the last 10 years as reproductive rates have decreased; cannibalism also has been recorded. The polar bear is now listed as a threatened species under the Endangered Species Act.

Because the oceans are a sink for carbon dioxide, the increased carbon dioxide has affected underwater sea life. The increased carbon dioxide causes an increase in acidity, which in turn causes a significant decrease in coral reef formation. Additionally, coral bleaching has occurred as a result of increased water temperature. For society, this means a loss of hunting culture and decreased food security.

There has been an increase in human health issues as well. Chronic diseases such as diabetes, asthma, and heart disease are increasing, as are obesity and incidence of infectious diseases. Mental health also has been affected, and depression rates are increasing. A recent study found that interpersonal

relationships, not wealth, make people happy, but significantly less people are happy than in the past. In addition to mental and physical health, social problems are increasing, including crime rates. As the population increases at an exponential rate, land use, transportation, energy consumption, and urban sprawl also increase. Tribes are unable to follow their tribal traditional ways of life and, as a result, are losing traditional knowledge, language, and income.

Although people look to the government to fix these problems, funding to government agencies has been declining and this trend will continue. Business must be done differently, and government agencies must lead by example. The media also is raising public awareness of the need to change, and the public is becoming more receptive to these ideas. The development of a national cultural sustainability model can aid this process.

Currently, EPA's environmental decisionmaking involves a risk assessment paradigm that assesses sickness but not health, and this approach is not sufficient to address environmental, social, economic, cultural, and spiritual relationship issues. Although risk assessment has a role in the process, tribal perspectives must be included. A sustainability model must be developed that is culturally relevant to communities. Sustainability is a transition from a linear perspective to a holistic, integrative process that includes long-term thinking; an economy integrated with nature; a systems flow of resources; renewable energy; and the realization that environmental, social, and economic challenges are an interconnected whole, not separate and competing.

EPA has started to embrace sustainability via the EPA Strategic Plan, the Sustainability Research Program, and other Agency activities, and the national EPA TSC health and well-being paradigm embraces sustainability as a holistic, integrative process. This approach will be tribally based, and its philosophy and approach originates from American Indians, incorporating a relational world view; respect for natural law; consideration of future generations; and tribal principles, laws, and traditional teachings. The utilization of culturally appropriate methods will make the approach meaningful and relevant in people's day-to-day lives and will allow them to embrace it.

James Ransom, St. Regis Mohawk Tribe, Tribal Council, Akwesasne, NY

James Ransom explained the symbolism of the two-row wampum treaty belt, which in the past symbolized the ships of white men and the canoes of Indians traveling in the same river. The vessels sometimes may come together, indicating that people are meant to help each other. The vessels are co-equals and must respect each other's culture, history, and knowledge. The three white beads on the wampum belt signify the principles of Peace, Good Mind, and Strength. These do not just occur; they require action, including good communication, acknowledgment of differences, and a willingness to work together to find solutions. In environmental terms, the canoe represents tribes, the ship represents EPA, and the river represents the earth. It is our responsibility to ensure that the earth is there for future generations, but its health is threatened now by global warming, pollution, invasive species, and so forth.

Sometimes, the relationship between the tribes and EPA has been one-sided because EPA has rules to follow and expects the same from the tribes. EPA is the first agency to work with the tribes, allowing tribes to set air and water quality standards, and it has instituted Indian program coordinators in each regional office, provided funding to tribes, and encouraged tribes to create their own environmental programs. EPA, however, has missed an opportunity to bring the culture and traditional knowledge systems from the tribes into Agency decisionmaking. Indians were the first to notice the changes in the environment and are the first to know when human activities violate natural laws. An example of this is the help that the Navajo Nation gave to the Centers for Disease Control and Prevention and the Indian Health Service during a hantavirus outbreak in the southwestern United States in 1993. EPA policymakers must listen to tribal ideas and approaches and be flexible in allowing tribes to incorporate traditional teachings and knowledge in their work.

Terry Williams, Tulalip Tribes, Natural Resources Program, Tulalip, WA

It is necessary to examine history to understand the future; we must examine the devastating changes that have occurred to the land and people in the past 100 years to understand how to correct these changes and prevent new ones. In examining the history of rivers near Tulalip, researchers discovered that reliable habitat data only went back to the 1930s, by which time many changes already had taken place. Because baseline data are not available, researchers are attempting to establish the baseline via extrapolation.

The two main national issues that must be examined are the expected doubling of the population during the next 25 years and climate change. Land use impacts are only one-half of the impacts affecting these issues. Because of the population explosion, it may be impossible to sustain the culture of certain or all tribes because of the loss of mammals, plants, and sea life. At the current rate, it is possible that salmon will be extinct in Washington State within the next 25 years. In addition to climate change, water will be a driving issue during the next decade, and tribal culture is intricately tied to potable water and water that sustains plants and animals.

In the Indian culture, all forms of life are brothers and sisters to human beings; we must interact with all species as if they are brothers and sisters and not mere resources. All of nature is interconnected, and all species are imprinted genetically at birth with a certain purpose in life. Humans are confused about their purpose and the job they were put on earth to do; humans must begin to follow the natural laws and fulfill our purpose.

The ecosystem is a fabric woven from the thread of all of the species that created it; humans have punched too many holes into the fabric, and it cannot be sustained. Scientists may not understand all ecosystem complexities, so they must use traditional knowledge to understand how species used to be. Once this is understood, if humans put the species back where they belong and let them fulfill their purpose, the environment will change for the better. Humans must show respect for plant and animal life, because they know their purpose.

When the Tulalip Tribe, at the time of the treaty with the white man, saw the white man decimating the local forests and wasting so many resources, they knew then that there would be future problems. Their traditional knowledge is so respected that when National Aeronautics and Space Administration (NASA) scientists were unable to establish a baseline, they approached the tribes to obtain a history of the land and determine one. From this baseline, future predictions can be made and the tipping point (e.g., "the point of no return") can be determined; NASA estimates this to be 10 years from now. To avoid this, we must be prepared to do things beyond our imagination, to adapt, to be stronger than we are, and to take action. The luxury of being able to perform studies is gone; we must act now.

Mary Arquette, Akwesasne Task Force on the Environment (ATFE), Akwesasne Freedom School, Hogansburg, NY

The Haudenosaunee Environmental Protection Process (HEPP) arose from the desire to work from the tribe's own knowledge base (i.e., not just adapt to New York State laws) to find a process that worked for the Haudenosaunee people. The Cultural Workshop Series, facilitated by the Haudenosaunee Nations, brought tribes together to examine the different environmental experiences of the various nations with an appreciation of the tribal members' knowledge base, familiarity with alternative methodologies, and work being done to protect their lands.

The ATFE is examining health in different ways and has designed a culturally based health model that examines traditional teachings, devises key components (i.e., wholeness, good relationships, survival) for the health of the people, and translates easily to other parts of the natural world. The definition of health (i.e., absence of disease vs. a more comprehensive definition) will influence the overall approach of the

HEPP. In determining this, elders were interviewed in their native language to determine: (1) What makes people healthy? (2) What makes ecosystems healthy? (3) What has changed? The elders also described the challenges that humans face, including dealing with many problems simultaneously. Resiliency is in the ability to try new things to face these challenges, but this in turn is dependant on the health of the natural world, which is the foundation for all things.

The state of one's body is not the only contributing factor to what makes a person healthy, complete, and spiritual. The mind is a key component, and relationships are important on all levels from the cellular level through international relationships of countries. This is a critical time, and relationships with the ecosystem are not being cultured as they once were. For example, fish advisories are impacting tribal love and knowledge of fishing; younger children are not being taught to fish because of the fear of mercury.

The ATFE Cultural Workshop Series teaches children tribal, cultural knowledge with hands-on activities that allow them to learn via interactions with each other and with the natural world. Children are taught about traditional medicines and foods, fishing, tanning hides, water drums, river protocols, sacred fire rituals, and so forth. The level of knowledge required to perform these activities is enormous, especially in the native language. Indigenous languages are hard to learn and speak, but this is an important cultural aspect that must be continued.

It is necessary for the tribes and EPA to work together to solve the inevitable problems. Although the realization is occurring that traditional knowledge is important, a lot of oppression has occurred already. The West and Indians can learn from each other and share each other's tools. It is time to get moving.

Preston Hardison, Tulalip Tribes, Natural Resources Program, Tulalip, WA

The Lifestream Principle states that we all inhabit the river of life; therefore, we must all cooperate as every action affects every other inhabitant. The web of mutual obligations is caused by the flow of knowledge, resources, and so forth. Such traditional knowledge has become an object of international law in the UN environmental, cultural, human rights, and economic systems. Indigenous peoples are using the UN system to reinforce the recognition of their rights, because although the United States recognizes them as sovereign, the UN does not. Indigenous peoples consider their cultural heritage rights (i.e., "Sovereignty Package") to include traditional knowledge, indigenous cosmovision, and self-determination within territories. Tribal rights outside of the bounds of the nation, such as traditional knowledge (intellectual property) and wildlife on federal land, also need to be recognized.

Article 8(j) of the Convention on Biological Diversity (CBD) states that traditional knowledge shall be respected and protected. Currently, the CBD is being interpreted so that the traditional knowledge and cultures of Native Americans can be respected, preserved, and maintained. Access and benefit sharing are being debated at this time. Under the Free Prior-Informed Consent rules, protection for tribal resources and knowledge is being secured; tribes will be able to decide who gets access to tribal knowledge and on what terms. Traditional knowledge should be protected in the same manner as scientific knowledge.

Indigenous peoples see knowledge as a gift of the creator. The knowledge is not kept secret, but tribes understand that to have this knowledge is a responsibility and that they are obligated to be the guardians of the knowledge. These guardians do not have control over the intellectual property in the traditional sense. Under tribal law, however, this knowledge is not considered public domain. Traditional knowledge is necessary to heal our earth; the scientific, spiritual, and tribal aspects must come together. Tribes should commit to work with the government to use traditional knowledge to help solve environmental problems. The information must be shared widely and efficiently but simultaneously protected. The government must understand that some knowledge is tribal sacred knowledge that cannot

be shared. Indigenous people want to share the knowledge they can, but they also do not want it to be misused. It must be shared in a sensible manner.

Mr. Hardison shared details about the Tulalip Tribes Cultural Stories Project, an information management system with more than 250,000 materials related to traditional knowledge and biodiversity. Information is searchable by categories, including stories (gathered from elders), people, countries, practices, projects, events, organizations, species, acronyms, sources, laws, and geographic areas, all of which are linked together. The database is available at http://www.culturalstories.net, where there are additional links to literary sources and resources, relevant organizations, and papers published by indigenous groups. A climate change Web site also is being constructed at http://native.climatecommons.net, which will collect stories about the effects of climate change on indigenous peoples. Mr. Hardison also described library connection catalog software called BookWhere.

Plenary Session Discussion

Dr. David Macarus, EPA Region 5, asked Mr. Williams what EPA and tribes could do together to handle climate change and on which items focus should be placed to make a difference. Mr. Williams responded that the water cycle is a good place to start. Technology has evolved so that most people have forgotten natural processes. Remembering the natural processes and cycles would be helpful. Examples include a project in which dairy farmers are taking cattle waste and using it to generate electricity. There also is a new technique from Japan regarding the biofiltration of water. These new technologies allow more biological alternatives that will decrease dependence on coal and oil. It is time for the Indian voice to be heard regarding changes that other Americans have not seen. EPA and tribes can educate together, sharing environmental and traditional knowledge.

TSC Session: Summary of Conference, Future Tribal Science Priorities and Goals, and Closing Comments

Roland Hemmett, U.S. Environmental Protection Agency, Region 2, Edison, NJ; David Nelson, Cheyenne River Sioux Tribe, Eagle Butte, SD

Mr. Hemmett explained that the TSC was formed in response to a request in 1999 from the National Tribal Caucus that a council be formed to provide a cross-Agency (i.e., ORD and regions) forum to discuss national tribal priority science issues and identify the most appropriate ways to address these issues. The TSC coordinates with the National Tribal Caucus to integrate science priorities into the Agency's annual planning and budget process. The TSC is a group of scientists educated in Western science and tribal traditional knowledge that is vital to understanding and addressing tribal science issues to protect the health of tribal communities. Tribal representatives identify the science priorities of the TSC, which is comprised of Agency representatives from each program and regional office and a tribal representative from each region. It is tribally driven, but a collaborative effort; EPA and tribes work together to develop solutions. Tribal representatives in each region determine the tribal priorities; the National Tribal Caucus endorses a national set of tribal priorities. The TSC directs the priorities to the appropriate EPA program or region and develops collaborative approaches to addressing the scientific issues. EPA may provide additional input based on its own advisory committees. The development of these priorities allows an understanding of tribal issues and related EPA activities, the development of collaborative solutions, and consideration of the Agency's planning process.

The most critical issue as identified by the tribes is tribal traditional lifeways. Tribal traditional lifeways encompass the unique cultural, spiritual, economic, and language practices pursued by tribal communities and must be included in the risk assessment process. Additional priorities, each equally important, include endocrine disrupting chemicals, dioxin and dioxin-like compounds, persistent bioaccumulative toxins source reduction, pharmaceuticals in wastewater, habitat loss, environmental triggers for

respiratory distress with special emphasis on mold, contaminated precipitation, and biological stressors. For each priority, exposure and impact risk, education, research, environmental justice, and restoration are considered. The next step is to work internally with program offices and ORD to address these issues by involving the EPA program office TSC representative with the program office tribal coordinator to discuss relevant priorities.

In terms of traditional tribal lifeways risk assessment and health and well-being, workshops to gather issues and ideas from tribal representatives and risk practitioners have been conducted, and a paper summarizing the information of tribal representatives and risk practitioners has been developed. Because EPA's current decisionmaking processes are more relevant to urban settings and not tribes, tribes have requested that EPA integrate tribal traditional lifeways into its current risk assessment policies and procedures and develop a new concept for environmental decisionmaking that focuses on human and ecological health and well-being. The short-term strategy includes increasing educational opportunities for tribes about EPA's risk assessment process, educating EPA about tribal values and culture, and outreach to tribes to encourage their involvement. Data collection will incorporate tribal traditional knowledge and qualitative data. Data will be collected appropriately at tribal sites, and tribal data will be tested for quality assurance. EPA will be sensitive to unique tribal features and exposures. The long-term strategy includes developing a new paradigm that integrates culture, lifeways, well-being, and the environment with risk prevention. The EPA Science and American Indians Web Site (http://www.epa.gov/osp/tribes.htm) is a good informational resource on this topic.

Mr. Nelson thanked the sponsors for their support and the approximately 310 attendees for their participation in making this a successful conference. The TSC received many informative comments throughout the meeting and will be able to gain perspective on the important issues and needs at hand.

A participant thanked the TSC for its efforts in conducting this conference and commented that the environmental challenges facing humans have been like a puzzle with a piece missing, the piece being thousands of years of indigenous knowledge. Now that the indigenous voice is being heard, it is possible that the ship and the canoe can come together and action can be taken.